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Elsewhere the writer has indicated some cases of eolian loess (Kan. Acad. Sci. Proc. 1916.), also similar deposits of aqueous origin. (Iowa Acad. Sci. Proc., Vol. XXVI, p. 356.) A few years ago he called attention to the probable different age and origin of the lower part of the loess at Kansas City, Mo. (Mo. Geol. Survey, Vol. X.) This paper is to emphasize its later date and aqueous origin. It is sixty to eighty feet in depth at many localities and is probably of early Wisconsin origin.

The reasons for believing in its aqueous origin are the following:

1. The terrace-like form of the deposit. At Kansas City, Mo., it forms a distinct bench along the north side of the city, with its top 125 to 150 feet above the river. Most of Kansas City, Kan., agrees in height. Also at Leavenworth and at other localities, given in a later section.

2. The occurrence of distinctly water-laid strata in the lower part of the terrace, and a gradual and indistinct passage upward into typical loess. This has been observed at the Kansas Cities, St. Joseph and Sioux City.

3. The low level of the base of the formation. This is usually very little above the level of the flood plain of the present stream, or 25 or 30 feet above the stream itself. This is in marked contrast with the usual bank of the stream, which is 150 to 200 feet of Carboniferous strata capped with till and loess. Moreover, this deposit occurs in bends or coves of the highland bluffs, as though it were in remnants of an old channel once deeply filled with it, and from which the present deeper channel has since been excavated.

Besides the localities already indicated, it has been noticed along the Missouri below Forest City, Mo., near Iowa Point, Kan., and along Wolf creek, a little above its junction with the Missouri. It appears along the Kansas near Armstrong, Muncie, Edwardsville, Holliday, Bonner Springs and northeast and northwest of Lawrence. The typical loess along the Missouri has the lighter buff color prevalent in the later sediments of that stream, while along the Kansas it is darker reddish, as if derived more from carboniferous shales.

This deposit has been so connected with the higher loess, which is probably of eolian origin, by wind action, hillside wash and creeping, that all have been considered one formation.

March 23, 1918.

Lacustrine Beds Near Atchison.

(Abstract.)

J. E. TODD.

It has been known for several years that there is thick deposit of sand exposed at Spaulding's quarry, a little northeast of Atchison, Kan.

The quarry is in the upper Oread limestone, its top being over fifty feet above the level of the flood plain of the Missouri. Upon the limestone lies a stratum of chert gravel, 8-10 feet in thickness, and upon that 50-60 feet of rather fine sand. Over all is 10-15 feet of Kansan till capped with 25-30 feet of loess. Northern erretics occur occasionally in the upper part of the sand, but not below. The sand corresponds in age to the

Aftonian beds of western Iowa, and were thought at first to be a river deposit like them, but further study has shown them to be uniformly fine and evenly stratified.

Similar beds have been found south of the creek which enters the Missouri south of the union depot, in the river bluffs and at frequent intervals for three or four miles southwest. A fine exposure occurs half a mile southwest of Forest park, on the north of the creek, where a cliff of slightly consolidated sand stands fifty feet high, which is capped with ten feet of till, the lower part of which is banded as though laid in water.

It appears, therefore, that the deposit was not the direct work of the Missouri, for it lies in the valley of a tributary rather than of that stream itself.

The most rational interpretation yet suggested is the following:

The chert graves mark the level of pre-glacial drainage. This at Atchison is at least twenty-five or thirty feet lower than the corresponding level in the Kansas river valley near Linwood, which indicates that Atchison was in the valley of a different master stream, presumably one which was a predecessor of the Platte of Nebraska, and of the Grand river, Missouri. Traces of its trough seem to have been found near Conception and Stanbury, Mo.

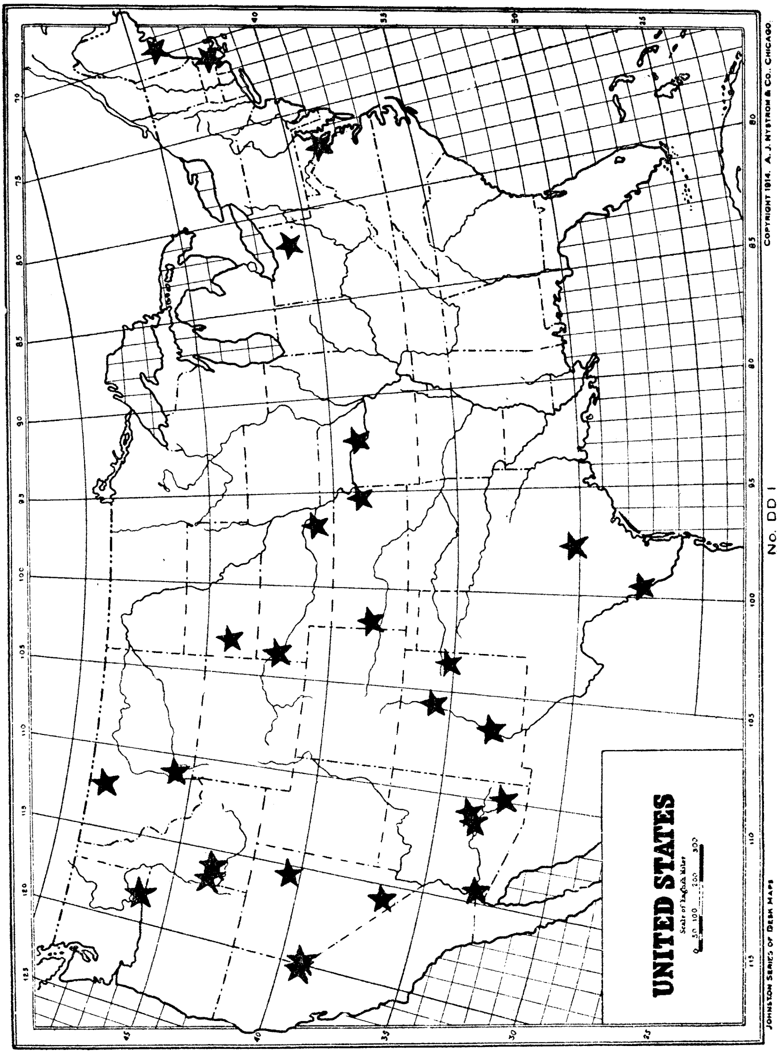
The advance of the Kansan ice sheet from Des Moines river valley southwest dammed the Platte-Grand river near Stanbury, causing a temporary lake or lakes in the valleys of that and of its tributaries, including that at Atchison. The water rose till it flowed over the divide south into the Kansas valley, presumably along the line of the present Missouri there.

This seems corroborated by the occurrence of a cobble and boulder deposit at Weston, Mo., and south, about 140 feet above the present Missouri. This, when discovered over twenty years ago, was thought to indicate rapids, very like such as this explanation would imply.

In frankness it should be acknowledged that similar lacustrine beds have not yet been found along the Nemaha, Nebraska, and Wolf creek, Kansas, as we should expect. Perhaps another twenty years may clear up the discrepancy.

March 23, 1918.

TRANS. KANSAS ACAD. SCI., VOL. XXIX. PLATE I.



Map of the United States showing evaporation stations.

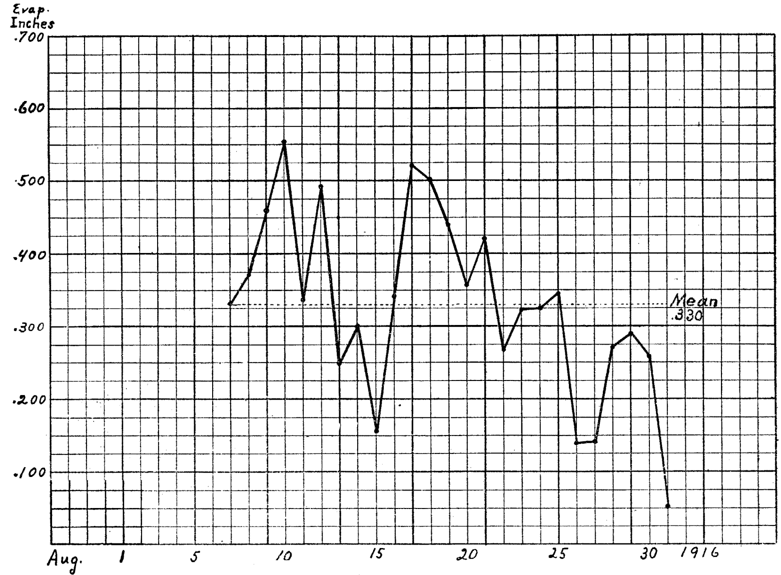


FIG. 1. Evaporation curve for August, 1916.

PLATE III.

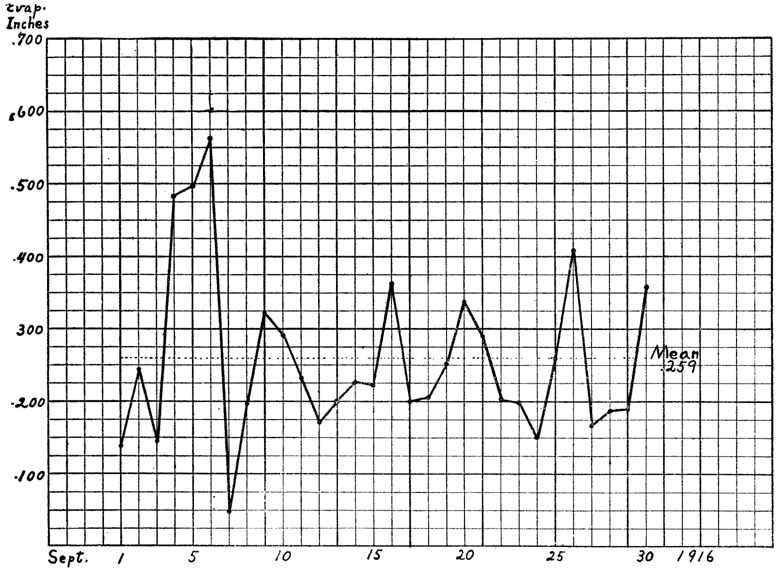


FIG. 2. Evaporation curve for September, 1916.

TRANS. KANSAS ACAD. SCI., VOL. XXIX. PLATE IV.

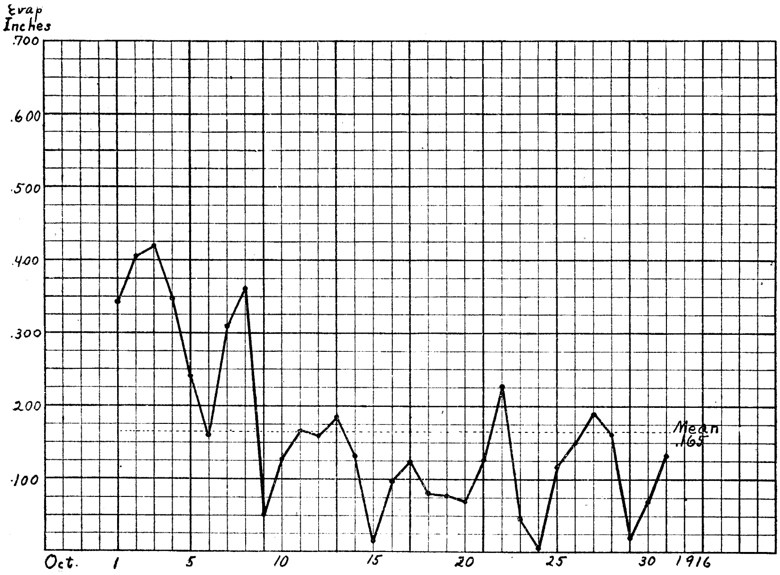


FIG. 3. Evaporation curve for October, 1916.

PLATE V.

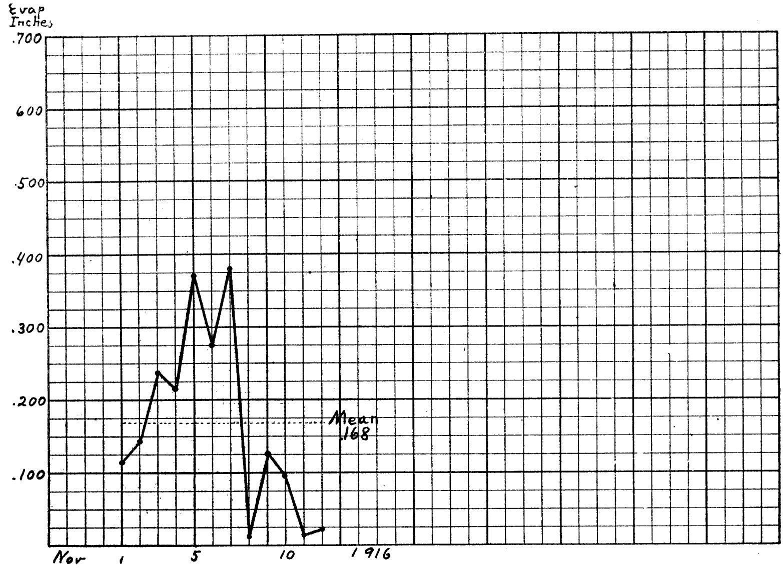


FIG. 4. Evaporation curve for November, 1916.

TRANS. KANSAS ACAD. SCI., VOL. XXIX. PLATE VI.

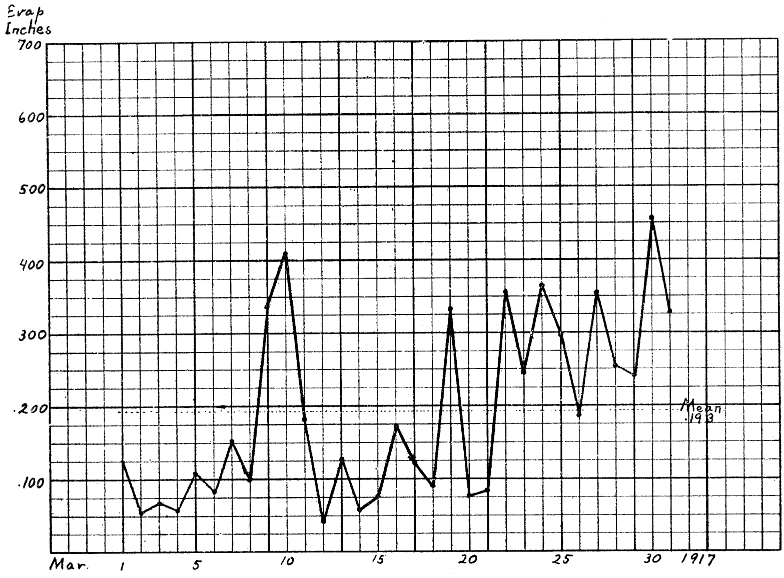


FIG. 5. Evaporation curve for March, 1917.

PLATE VII.

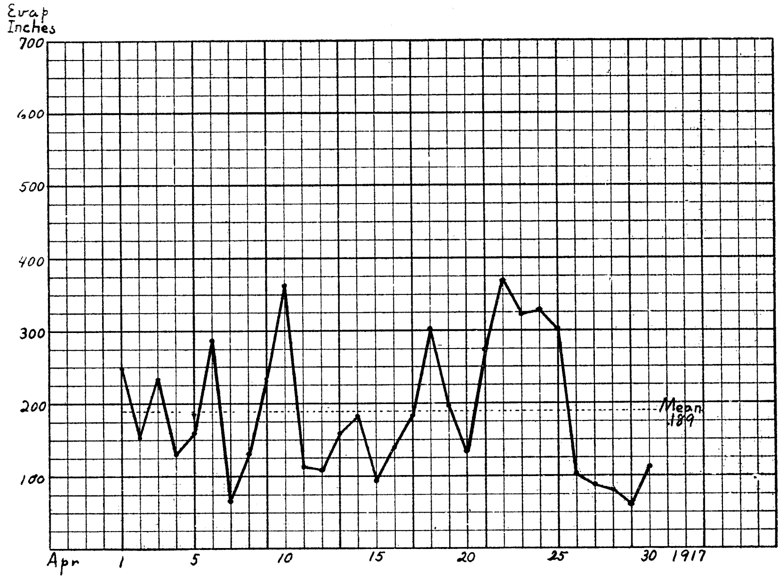


FIG. 6. Evaporation curve for April, 1917.

TRANS. KANSAS ACAD. SCI., VOL. XXIX. PLATE VIII.

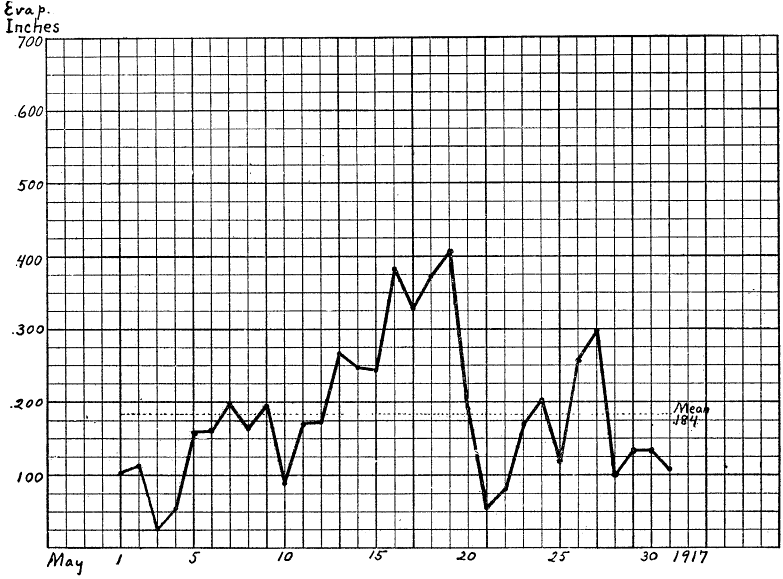


FIG. 7. Evaporation curve for May, 1917.

PLATE IX.

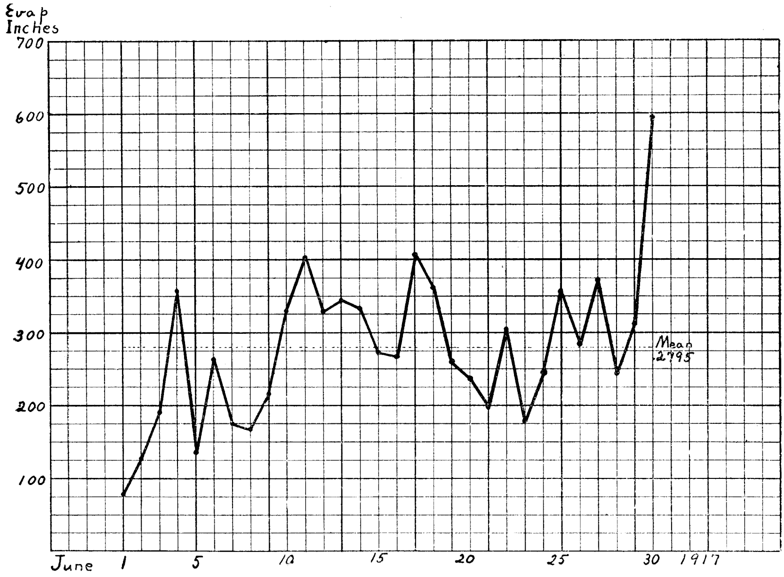


FIG. 8. Evaporation curve for June, 1917.

TRANS. KANSAS ACAD. SCI., VOL. XXIX. PLATE X.

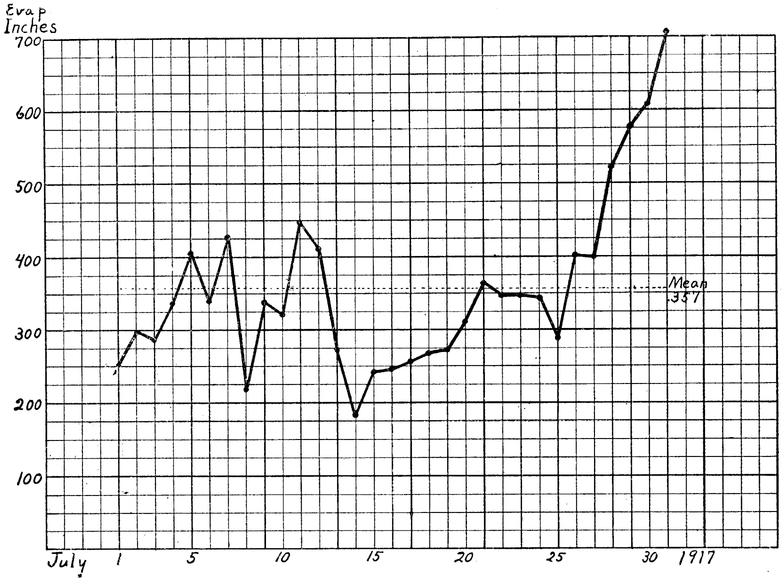


FIG. 9. Evaporation curve for July, 1917.

PLATE XI.

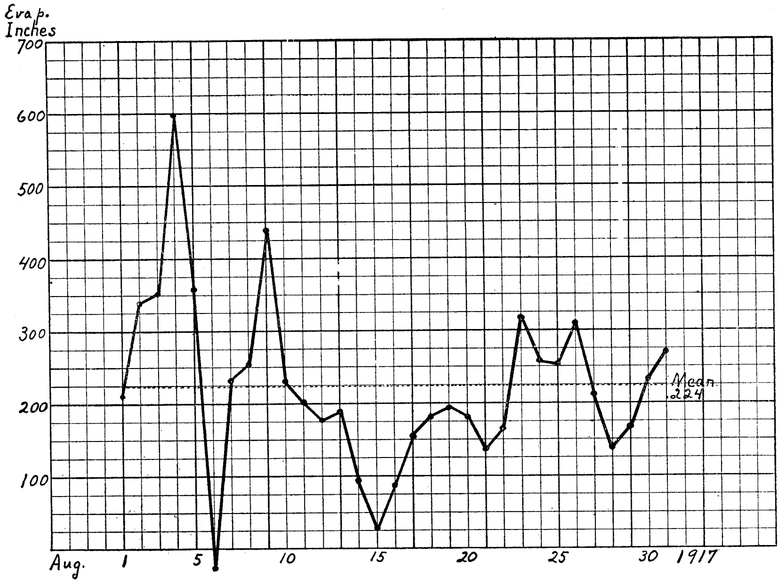


FIG. 10. Evaporation curve for August, 1917.

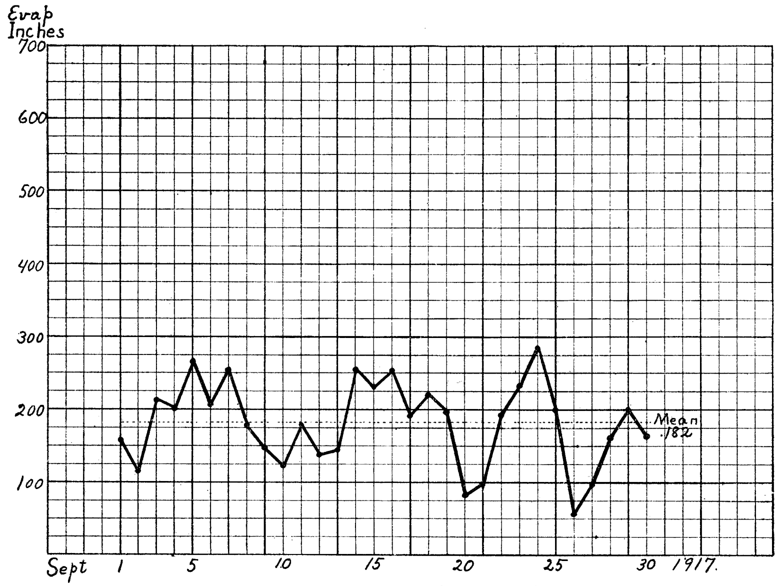


FIG. 11. Evaporation curve for September, 1917.

PLATE XIII.

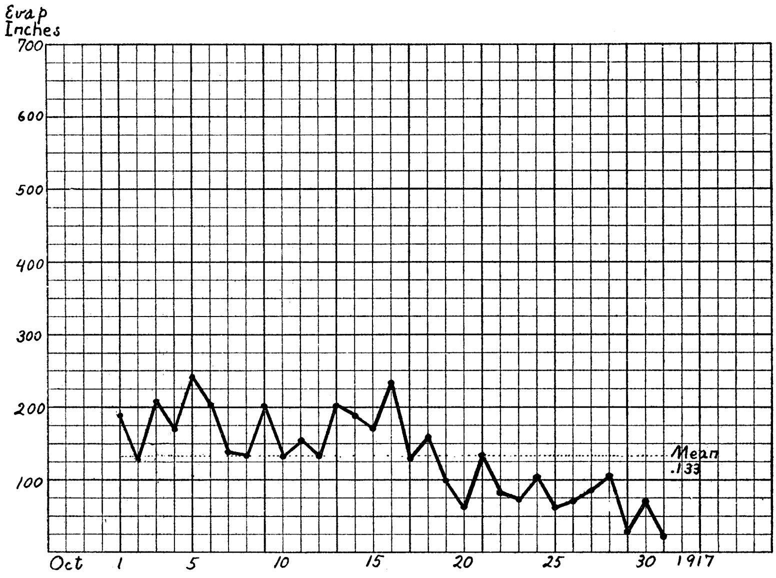


FIG. 12. Evaporation curve for October, 1917.

TRANS. KANSAS ACAD. SCI., VOL. XXIX. PLATE XIV.

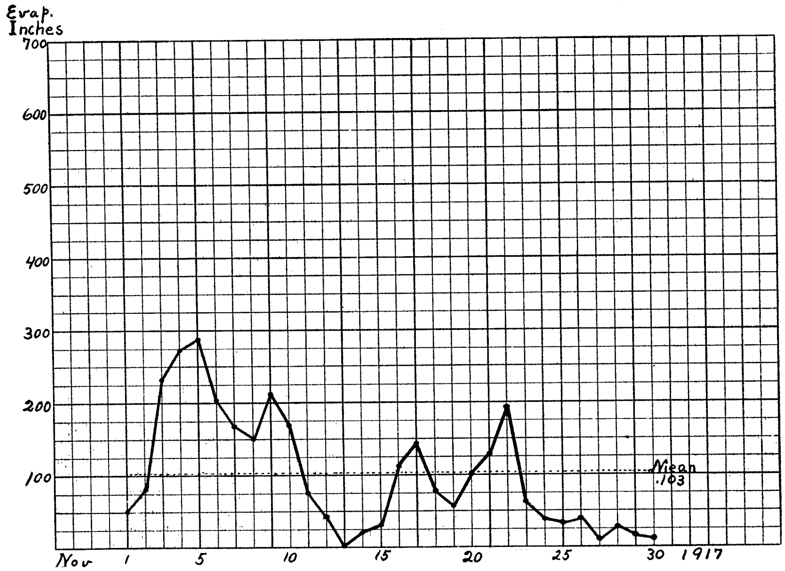


FIG. 13. Evaporation curve for November, 1917.

PLATE XV.

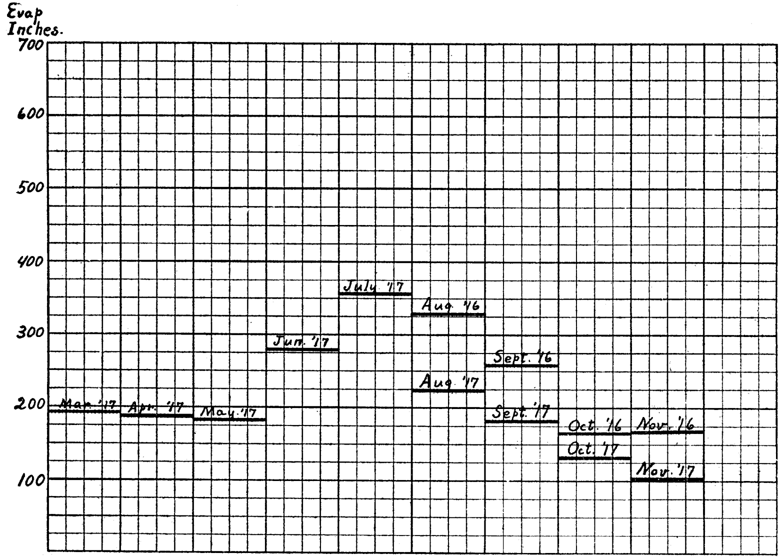


FIG. 14. Summary of evaporation data for 1916-'17.